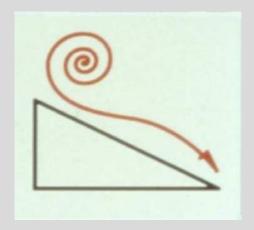


## Compost Operators Training Certificate Course





#### Overview

- **❖Site Planning**
- ❖Odor and Site Design
- Neighborhood Public Relations
- Capacity and Sizing
- **❖Site Layout**
- Site Selection
- **❖Site Design**
- **❖Site Management Plan**



#### Introduction

- **❖Good site design can prevent** 
  - Odor problems
  - Excessive processing costs
  - ❖Program failure
  - Stormwater contamination
- Good site design is essential and often goes overlooked

## Preliminary Site Planning

- Identify key areas and factors which will affect operations (traffic flow, wind direction, runoff patterns, surrounding land uses, wetlands/water bodies)
- Develop preliminary sketch of facility
- Understand local and state permitting and regulations



## Permitting and Regulation

- ❖Michigan PA 451, Part 115
  - ❖Materials allowed for composting include:
    - **\*** leaves
    - grass clippings
    - brush/wood chips
    - food scraps
- Local zoning and material acceptance
- Site and building plan approval
- Surface and ground water regulations
- Federally based NPDES requirements

#### Factors that Affect Odor

- High intensity processing (high volumes at small site)
- **❖Puddles**
- Lack of retention pond maintenance
- Proximity to neighbors / minimal screening
- **❖Poor Site Design!**



## Typical Odors

- Ammonias and sulfides (rotten egg smell)
  - ❖ Due to excess moisture
- Amines (fishy smell) and Volatile Fatty Acids (VFA's)
  - **❖** Due to anaerobic conditions/unstable process
  - Anaerobic byproducts can cause acidity, which can cause metal leaching from pile



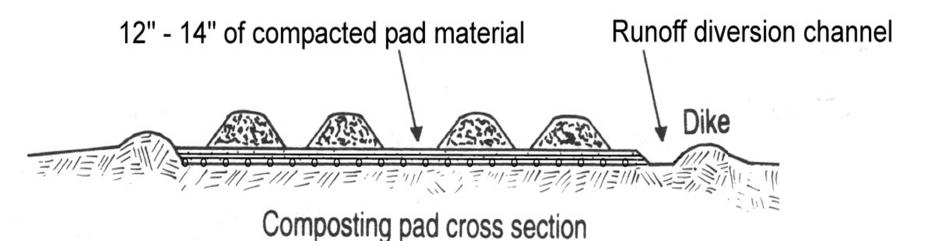
#### **Odor Prevention**

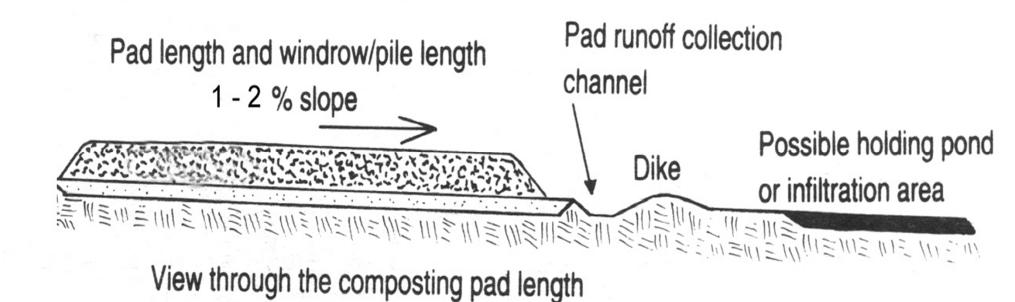
- **❖Site Location and Size** 
  - **❖Setbacks from "sensitive receptors"** 
    - **❖300** ft from residents
    - **❖500** ft from schools, hospitals
  - **❖**Adequately sized site
- Site Surface and Drainage Design
  - Proper slopes, pad preparation, runoff control
- Other Controls
  - ❖Biofilters for in-vessel or enclosed systems



## Drainage Design

- Collect and manage run-off
  - ❖Slope pad to facilitate moisture runoff away from compost piles, surface slope: 1%-2%
- Bio-swales/ditches to convey runoff
  - ❖Simple Design, Easy Cleanout
- Retention Pond
  - **❖For medium to large sites (greater than 5 total acres)**
  - **❖Reduce offsite flow**
  - **❖** Allow sedimentation to occur before re-use or release
  - **❖**Require periodic maintenance













## Neighborhood Public Relations

- Educating neighbors and public officials
- Isolate screening activity
- Locate grinding operations away from property line
- Install noise/dust suppression systems
- Install air exchange equipment for indoor operations (up to 5 exchanges per hour)
- Minimize and control odors; use of biofilters



## Optimal Processing Volumes

Processing Annual Material Volume

Low intensity 3,000 cy/acre/yr

Medium intensity 5,000 cy/acre/yr

High intensity 8,000 cy/acre/yr

Note: Michigan compost rules state a limitation of 5,000 CY per acre at any one time







## Site Layout - Process Flow

- Site Access / Maneuvering
  - Safety/Security lighting, fencing
  - **❖Signage**
- **❖**Receiving and Storage
- Mixing and Loading
- Active Composting access to water
- Curing and Screening
- Storage and Marketing



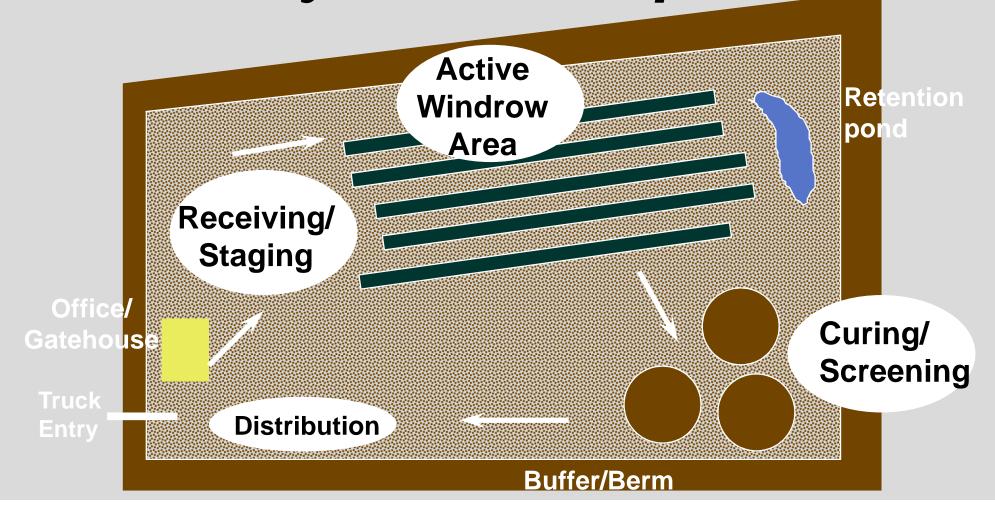
## Site Layout - Regulations

- Follow regulatory setback requirements for
  - distance from residences
  - distance from wells
  - distance from bodies of water
- Follow local zoning requirements for
  - **♦ Setbacks**
  - ❖Buffer/berms
  - ❖Site/road access
  - **<b>⇔**Utilities



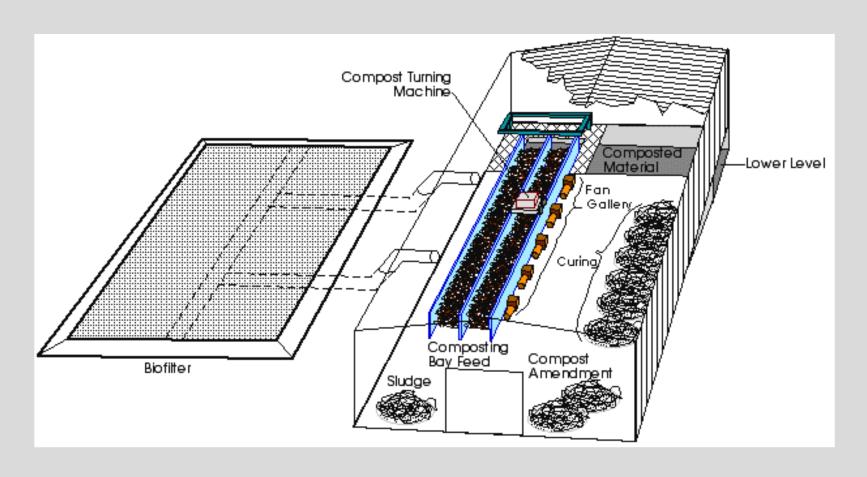
#### Siting and Site Design

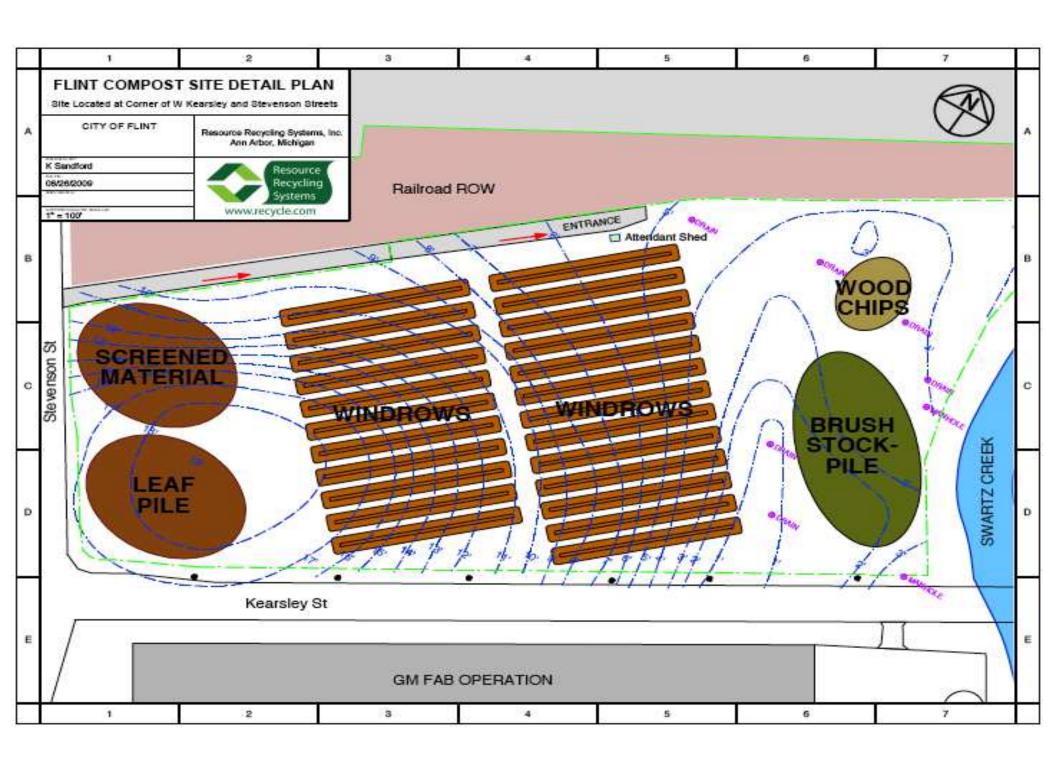
## Site Layout - Example

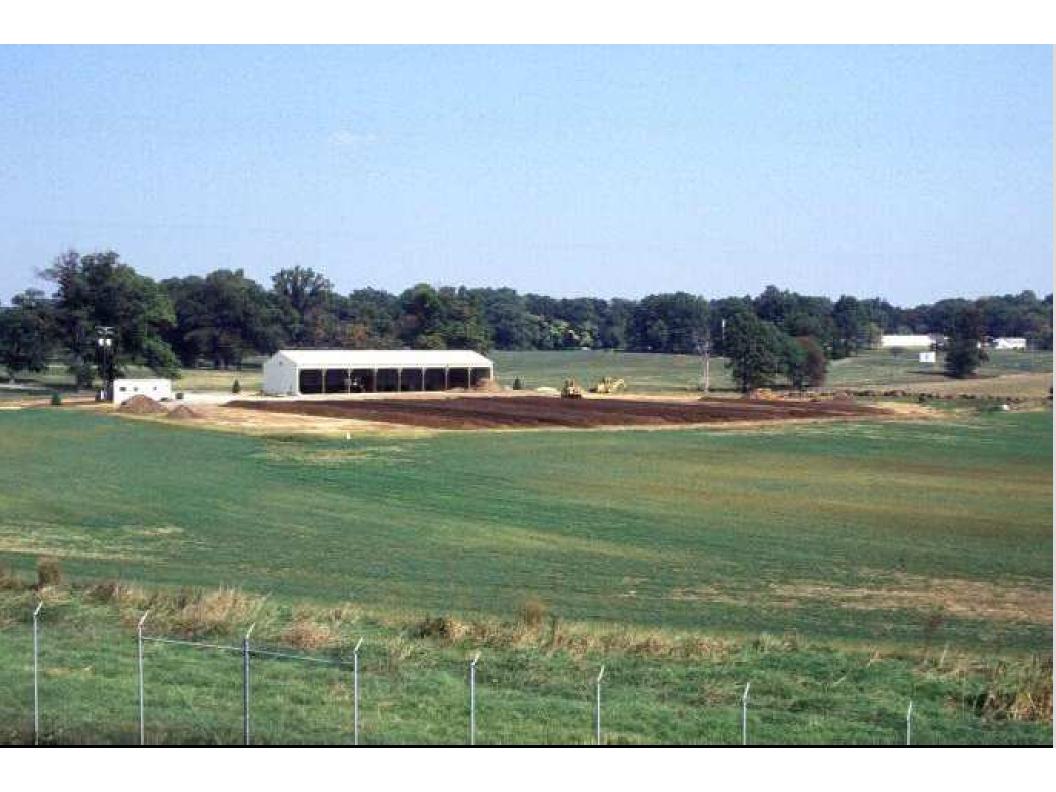




## Site Layout - Example







## Site Layout - Objectives

- Safety and Security
- Provide for good housekeeping and ease of maintenance
- Minimize system delays and material handling
- Maintain flexibility
- Separate feedstock piles to allow precise combining of materials
- Utilize personnel and space efficiently
- Access to quality end products











## Site Layout - Area Requirements

- Staging/Receiving: 20-30% of site
- **❖Processing: 55-65%**
- ❖Curing/Storage: 10-20%

Also consider space for site access, equipment movement, storage, unloading and loading, fall leaf stockpile



## Site Layout – Active Compost

- Estimate peak volumes
- Number of windrows and aisle space needed
  - **❖** Depends on turning equipment
  - Depends on material type and processing requirements
- Indoor or in-vessel active composting area needs are different

**See Compost Pad Area Calculation Worksheet** 



### Site Selection Criteria

- **❖Public Acceptance**
- Proximity to generators and customers
- Proximity to transportation corridors
- Access Roads firm surface to support vehicles under varying weather conditions
- Size/Opportunity for expansion bigger is better
- Cost to develop and use
- Drainage, runoff control



## Site Selection Criteria (con't.)

- Zoning and surrounding land use agriculture or industrial zones are the best locations
- **❖FAA** regulations prohibit the existence of compost facilities within 10,000 feet of any airport.
- Odor Considerations:
  - Prevailing winds
  - **❖Proximity to residential areas**
  - Appearance (perception: "if it looks clean, it smells clean")



## Site Selection Criteria (con't)

- **♦ Setbacks**
  - Sensitive receptor (e.g. hospitals, churches, schools, nursing homes)
  - Residences
  - Active wells
  - ❖ Natural or artificial wetlands
  - Property lines
- Buffers block the effects of noise, odor, and visual impacts of the site from neighbors
  - **❖**Walls, trees, berms



# Siting and Site Design Site Options

ADVANTAGES OF POTENTIAL SITES FOR PROPOSED COMPOST PROGRAM				
Advantage	Site 1	Site 2	Site 3	Site 4
Sufficient space to site in-vessel operation	<b>✓</b>		<b>✓</b>	<b>✓</b>
Centrally located to campus	<b>✓</b>	<b>✓</b>		
Educational opportunities			<b>✓</b>	
Long-term site potential			<b>✓</b>	
Lack of regulatory hurdles			$\checkmark$	$\checkmark$
Available supply of wood chips	<b>✓</b>	<b>✓</b>		
Utilities available	$\checkmark$	<b>✓</b>	<b>✓</b>	

# Site Design/Engineering

- **❖Balance utility and cost**
- Base materials under pavement or gravel
- Sub-base preparation (organic removal, compaction, etc.) usually required
- ❖Pad maintenance includes clearing aisles; grading or eliminating ruts
- Consider if buildings, enclosed vessel equipment or biofilter is needed (biosolids or food waste)



### Siting and Site Design

# Typical Site Construction Costs

#### Pad Type

Earth Pad (no fill)

❖Gravel/Slag

Asphalt Pad

Concrete Pad

#### **Average Cost per acre**

\$7,000 - 10,000

\$30,00 - 50,000

\$65,000 - 100,000

\$150,000 and up













## Site Surface Design

- ❖Pad Surface Material and Design
  - ❖Year round access and stability
  - **❖**Paved, gravel or asphalt working surface
  - Engineered fill on stripped ground
- **❖Pad Surface Slope** 
  - **❖** Asphalt surface slope greater than 1%
  - **❖Gravel/slag surface slope greater than 2%**
- Engineered pads have less problems with mud, ruts, and anaerobic conditions.

## Pad Surface Material

- Strip topsoil, compact ground surface
- Add geotextile where underlying wet clays are present
- Add appropriate base and sub base material of gravel (8 inches)
- ❖Final layer
  - ❖Rigid pavement if permeable and water table is within 4 feet, or for mixing raw material with bucket loader
  - **❖Otherwise**, gravel or slag















## Site Management Plan

- **❖** Materials acceptance criteria
- Site layout and design parameters
- Operations details
- Equipment and staffing requirements
- Marketing plans for finished product



#### Thank you!

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